

Ganoga Lake [Sullivan County], June, 1898, *S. Brown*; Corry [Erie County], June 1, 1893, *J. R. Churchill*.

Specimens of these collections, except the last cited, are in the Herbarium of the Academy of Natural Sciences and have received critical examination by Mr. Mackenzie.

ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA.

ANDROPOGON SCOPARIUS IN THE UNITED STATES AND CANADA.

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THE marked variability of *Andropogon scoparius* is known to most collectors and different authors have described varieties and forms of the species, some of which have been raised to specific rank. With a view to classifying these variants a careful study of the species was undertaken at the suggestion of Prof. M. L. Fernald who has kindly given me his advice on numerous points. I am also indebted to Mr. Bayard Long for the loan of the material in the herbarium of the Academy of Natural Sciences of Philadelphia and to Miss K. D. Kimball of the New York Botanical Garden for notes on the type of *Andropogon littoralis*.

Many of the characters which have been used for separation of varieties or species do not prove constant enough, to have value in classification. This is the case with such features as the color of plant, length of sessile spikelet, villousness of sheaths and leaves, compression of sheaths and length of hairs at the apex of the internodes of the rachis. Hackel in DC. Monogr. Phan. 6: 384 (1889) describes six forms or subvarieties (along some of these lines) which are scarcely determinable except in their extreme development. The species, however, seems to divide into three reasonably marked varieties: the common widespread form with glabrous sheaths and open, elongated inflorescence which intergrades with the other two forms; the second or typical form also with an open, elongated inflorescence, described by Michaux Fl. Bor. Am. 1: 57 (1803) "A vaginis villosis," and thus at once recognizable as the villous-sheathed form; the third form

with glabrous sheaths, but a many-branched, flabellate inflorescence. The last two forms also have fairly well marked geographic ranges.

ANDROPOGON SCOPARIUS Michx. [sensu ampliore]. *Schizachyrium scoparius* (Michx.) Nash in Small Fl. S. E. U. S. 59 (1903). Extremely variable, commonly strongly cespitose and with fibrous roots, but occasionally in sandy localities rather loosely tufted with an apparent vertical rootstock up to 5 cm. long. Color of plant green, purplish or strongly glaucous. Culms terete to rather strongly compressed, of very variable height and usually with only a few widely separated nodes, but in the sand form with the basal nodes close together and the extreme base of the culm rather indurated. Sheaths convex to strongly flattened and almost plicate, glabrous to strongly villous, the basal ones all arising from very close to the base of the culm or in the sand form from a series of closely situated nodes and apt to be strongly equitant and rather fan-spreading. Leaves variable in length and breadth, flat to frequently plicate, the mid-rib usually prominent below, glabrous on both surfaces to rather strongly villous on one or both surfaces. Inflorescence in the commoner form open and elongated with relatively few branches varying to rather dense and flabellate with many branches in var. *polyclados*. Bract-like sheaths subtending the racemes inconspicuous to rather large and spathe-like. Rachis of the raceme nearly straight to very flexuous, more or less hairy, the hairs at the top of the internodes varying from 1 to 5 mm. long. Pedicels of the sterile spikelets variable in length, erect to more or less recurved and varying in the density and length of the marginal ciliation. Sessile spikelets 4.5–11.5 mm. long with a geniculate awn 4–15 mm. long; pedicellate spikelets composed of one or less often of two empty glumes, 1–7 mm. long, awnless or terminated by an awn which may reach a length of 4 mm.

Var. VILLOSISSIMUS Kearney ex Scribn. & Ball in Bull. U. S. Div. Agrost. 24: 41 (1900). *A. scoparius* Michx. [sensu stricto] Fl. Bor. Am. 1: 57 (1803). *Schizachyrium villosissimum* (Kearney) Nash in Small Fl. S. E. U. S. 59 (1903). Sheaths more or less densely villous. Blades sometimes more or less villous on the lower surface, the upper surface usually villous at least near the sheath. Inflorescence open and elongated. MASSACHUSETTS: Sesachacha River, Nantucket Island, July 26, 1911, *E. F. Williams* (N. E.)¹; Sankaty Head, Nantucket Island, July 29, 1911, *E. F. Williams* (N. E.); Nantucket, August 18, 1878, *E. & C. E. Faxon* (Gr., N. E.). NEW JERSEY: sandy barrens near Homerstown (New Egypt), Ocean Co., September 22, 1906, *J. H. Grove*, no. 403 (Ph.); common in old barren fields etc., Brindletown, Ocean Co., August 22, 1905, *J. H. Grove* (Ph.); margin

¹ In listing herbaria the following abbreviations are used: Gr., Gray; N. E., New England Botanical Club; N. Y., New York Botanical Garden; C., Columbia College, deposited at the New York Botanical Garden; Ph., Academy of Natural Sciences, Philadelphia, including the Philadelphia Botanical Club collection.

of dry sandy woods south of station on Salem Branch of W. G. & S. R. R., Tomlin, Gloucester Co., September 9, 1911, *Bayard Long*, no. 6797 (Ph.); Swedesboro, August 5, 1893, *Charles D. Lippencott* (Ph.). PENNSYLVANIA: Wilt's Mill Meadows along Trout creek E. of 12th Ward, vicinity of Allentown, Lehigh Co., *Harold W. Pretz*, no. 6099 (Ph.); meadows along N. side P. R. R. $\frac{5}{8}$ mile S. W. of Emaus P. O., vicinity of the South Mountains, Lehigh Co., August 2, 1913, *Harold W. Pretz*, no. 5994 (Ph.), August 2, 1913, *Harold W. Pretz*, no. 5995 (Ph.); woods beside road about $2\frac{1}{8}$ miles S. W. of Locust Valley P. O., Lehigh Co., October 3, 1915, *Harold W. Pretz*, no. 7977 (Ph.); vicinity of marshy meadows along Indian creek $\frac{3}{4}$ mile N. by N. E. of Sigmund, Lehigh Co., August 23, 1914, *Harold W. Pretz*, no. 7183; on serpentine, Fern Hill, Chester Co., September 7, 1908, *E. B. Bartram* (Ph.). DELAWARE: dry soil Talleyville, August 31, 1897, *A. Commons*, no. 107 (Ph.). DISTRICT OF COLUMBIA: sterile knoll of clay and sand, Deanwood, September 9, 1905, *A. S. Hitchcock*, Amer. Gr. Nat. Herb. no. 268 (Gr.). NORTH CAROLINA: moist, sandy soil, Clarkton, Bladen Co., October 7, 1897, *Biltmore Herbarium*, no. 20^b (Gr.); a very glaucous form found growing along the French Broad River near Biltmore, Buncombe Co., September 13, 1898, *Biltmore Herbarium*, no. 20^e (Gr.). SOUTH CAROLINA: damp Pine land, Santee Canal, October, *H. W. Ravenel* (Gr.). GEORGIA: rather dry pine-barrens near Brookfield, Berrien Co., September 27, 1902, *Roland M. Harper*, no. 1684 (Gr.). FLORIDA: Tampa, 1898, *Robert Combs*, no. 1348 (Gr.); Braidentown, September 19, 1900, *S. M. Tracy*, no. 7092 (Gr.); no locality, *Chapman* (Gr.). ALABAMA: Gateswood, October 30, 1903, *S. M. Tracy*, no. 8393 (Gr.). MISSISSIPPI: Biloxi, Harrison Co., September 15, 1893, *S. M. Tracy*, no. 1397 (Gr.). LOUISIANA: Jacksonville, *J. C.* (Gr.). MISSOURI: near Sulphur Springs, August 14, 1910, *Earl E. Sherff*, no. 1052 (Gr.). ILLINOIS: dry gravel hillside near Wady Petra, Stark Co., September 17, 1897, *Virginus H. Chase*, no. 126 (Ph.); Black-jack oak association, Bath, August 17, 1903, *H. A. Gleason* (Gr.). INDIANA: sand, Dune Park, September 6, 1897, *Agnes Chase*, no. 622 (Ph.). IOWA: Carnarvon, August 29, 1896, *L. H. Pammel*, no. 294 (Gr.); Winterset, September 1895, *G. W. Carver*, no. 266 (Gr.).

Variety *villosissimus* is essentially a plant of costal plain distribution along the Atlantic coast running up into Lehigh County, Pennsylvania, the mountains of North Carolina and Georgia in isolated localities and also occurring in the Mississippi basin as far north as Illinois with two rather remote stations in Iowa. As a whole the more pronounced specimens are confined to the Atlantic seaboard whereas those from the Mississippi basin usually show only slight villosity. The following specimens listed above approach var. *frequens* very closely only a few hairs being noted on one or two sheaths. NEW JERSEY: Brindletown, *J. H. Grove*. PENNSYLVANIA: N. E. of Sigmund, *H. W. Pretz*, no. 7183. DELAWARE: Talleyville, *A. Commons*,

no. 107. FLORIDA: Tampa, *R. Combs*, no. 1348. INDIANA: Dune Park, *Agnes Chase*, no. 622. ILLINOIS: Bath, *H. A. Gleason*. IOWA: Carnarvon, *L. H. Pammel*, no. 294; Winterset, *G. W. Carver*, no. 266. The inflorescence of two specimens shows a marked tendency toward var. *polyclados*. FLORIDA: Braidentown, *S. M. Tracy*, no. 7092. MISSISSIPPI: Biloxi, *S. M. Tracy*, no. 1397 [only the upper portion of the plant, which also has sparsely villous sheaths]. There is also one specimen in the herbarium of the New England Botanical Club, MASSACHUSETTS: gravelly pasture, Concord, September, *Edward S. Hoar*, which belongs in this variety, but the certainty of its being from Concord is open to some question and consequently it was omitted from the general citation of specimens.

Var. **frequens** Hubb., var. nov.¹ Plerumque dense caespitosa; vaginis foliisque glabris (laminis supra basin versus interdum paullo villosis); inflorescentia elongata simplice laxa.

Usually densely cespitose with glabrous sheaths and leaves (sometimes the base of the blade somewhat villous on the upper surface) and with an elongated, simple, open inflorescence. RHODE ISLAND: dry open fields and hillsides near Dickens Point, Block Island, Newport Co., September 15, 1913, *M. L. Fernald*, *Bayard Long* and *G. S. Torrey*, no. 8476 (TYPE in Gray Herb., N. E., Ph.). General distribution New Brunswick to Saskatchewan and Montana south to Georgia, Texas and eastern Arizona. The species is also reported from Washington [Nash in *N. Am. Fl.* **17**: 106 (1912)], but I have seen no specimens and can find no other reference to it in that state, nor have I seen specimens of this variety from Florida.

Variety *frequens* is the common form of the species showing a wide range of variation, but no constant grouping of characters which would justify subdivision. Certain specimens growing in sandy locations or in railroad ballast show more nodes at the base of the culm, more compression of the basal sheaths and a tendency to produce vertical rootstocks, but these characters are variable and not always combined. The following specimens show a strong tendency toward var. *polyclados*. PENNSYLVANIA: serpentine barrens, Mineral Hill, Delaware Co., September 6, 1908, *Francis W. Pennell*, no. 597 (Ph.). MISSOURI: fields, Hannibal, October 26, 1911, *John Davis*, no. 1425 (Gr.).

Var. POLYCLADOS Scribn. & Ball in *Bull. U. S. Div. Agrost.* **24**: 40 (1900). *A. littoralis* Nash in *Britton Man.* 69 (1901). *A. scoparius* var. *littoralis* (Nash) Hitchc. in *RHODORA* **8**: 205 (1906). *Schizachyrium littorale* (Nash) Bicknell in *Bull. Torr. Bot. Cl.* **35**: 182 (1908). Sometimes densely tufted, with more or less strongly flattened, glabrous sheaths. Leaves glabrous on the lower surface, glabrous or more or less villous above especially toward the base. Inflorescence many branched above and more or less densely flabellate.

¹ *A. purpurascens* Muhl. ex Willd. *Sp. Pl.* **4**: 913 (1806) and *A. flexilis* Bosc ex Poir. in *Lam. Encycl. Suppl.* **1**: 583 (1810) probably belong here.

MASSACHUSETTS: gravelly soil, Cambridge, October 16, 1908, *A. S. Pease*, no. 11834 (N. E.); Chilmark, Dukes Co., Marthas Vineyard, August 19, 1895, *Sydney Harris* (N. E.), pasture land, farm, August 19, 1895, *Sydney Harris* (N. E.); sandy soil, Tea Lane, Chilmark, Dukes Co., Marthas Vineyard, September 21, 1916, *F. C. Seymour* (Gr.). NEW YORK: Long Beach, Nassau Co., Long Island, September 2, 1906, *R. M. Harper* (N. Y.); Rockaway Point, Long Island, October 22, 1908, *E. P. Bicknell* (N. Y.);¹ along seashore at Staten Island, October, 1894, *Geo. V. Nash* (TYPE of *A. littoralis*, N. Y.). NEW JERSEY: Seaside Park, Ocean Co., August 30, 1908, *E. B. Bartram* (Ph.), September 27, 1908, *R. B. Bartram* (Ph.); Clementon, September 3, 1898, *Alexander MacElwee, Jr.* (Ph.); marshes at Atlantic City, 1884, *Vasey* (Gr.); Ocean City, September 4, 1912, *C. D. Fretz* (Ph.); Wildwood, September 20, 1902, *Albrecht Jahn*; dry sand dunes, Five-mile Beach, Cape May Co., October 3, 1899, *Alexander MacElwee* (Ph.), on sand dunes, September 25, 1900, *Alexander MacElwee*, no. 2024 (Ph.) [exceptional, approaching var. *villosissimus* as several of the sheaths are villous]; East Cape May, Cape May Co., September 20, 1911, *O. H. Brown* (Ph.); Cape May, October 9, 1881, *no collector given* (Ph.); Cape May Point, Cape May Co., September 16, 1906, *S. S. Van Pelt* (Ph.). PENNSYLVANIA: dry gravelly soil, Betzwood, Montgomery Co., October 16, 1900, *Alexander MacElwee*, no. 2121 (Ph.); East Park, Philadelphia, September 18, 1898, *A. F. K. Krout* (Ph.); Philadelphia, *Conard* (Ph.); Williamson School, Delaware Co., September, 1896, *Alexander MacElwee, Jr.* (Ph.); on serpentine, Goshenville, Chester Co., September 25, 1910, *E. B. Bartram*, no. 1207 (Ph.). DELAWARE: Centreville, New Castle Co., September, 1863, *A. Commons* (Ph.), dry soil, September 6, 1878, *A. Commons*, no. 106 (Ph.); sandy soil, Cedar Neck, Sussex Co., September 10, 1875, *A. Commons*, no. 108 (Ph.). GEORGIA: on the slopes and summit of Stone Mountain, De Kalb Co., altitude 1000–1686 feet, September 6–12, 1894, *John K. Small* (N. Y., C., Ph.). MISSISSIPPI: Biloxi, August 22, 1900, *S. M. Tracy*, no. 4760 (Gr.); Bayou Porto, October 14, 1897, no. 3795 (Gr.). TEXAS: prairies, Dallas, August 30, 1900, *G. Reverchon*, no. 1164 (Gr.); common prairie grass, covering extensive surfaces, Comanche Spring, September 1849, *F. Lindheimer*, no. 166 (Gr.), September 1849, *F. Lindheimer*, no. 1247 (Gr., Ph.); Rio Grande, without date, *Schott* (Gr.); Liano, October, 1847 [*F. Lindheimer* fide Dr. Robinson], no. 3 (Gr.). OKLAHOMA: Sapulpa, Creek Co., August 24, 1895, *J. W. Blankinship* (Gr.). MISSOURI: common, dry ground, Jackson Co., September 26, 1893, *B. F. Bush*, no. 382 (Gr.). KANSAS: prairie, Riley Co., September 18, 1895, *G. B. Norton*, no. 582 (Gr.). NEBRASKA?: Republican Fork, 1856, *H. Engelmann* (Gr.). IOWA: Sioux City, August 29, 1896, *L. H. Pammel*, no. 107 (Gr.); without location, 1876, *M. E. Jones*, no. 5 (Gr.).

¹ Another specimen which I believe to be from Long Island is Long Point, October 15, 1905, *E. P. Bicknell* (N. Y.).

The distribution of var. *polyclados* is essentially that of the coast plain along the Atlantic seaboard and inland up the Mississippi basin with its most marked development along the Atlantic seaboard from Marthas Vineyard southward where it was segregated as *A. littoralis*. A study of the type of *A. littoralis* Nash and of other specimens so determined by Mr. Nash fails to show any satisfactory combination of characters. It is true that these specimens usually show a tendency to have several nodes close together at the base of the culm and a marked tendency toward a vertical rootstock, but I believe these are ecological characters due to the sandy soil as gradations are common and similar tendencies were noted in var. *frequens*. The compression of the sheaths also seems too instable to carry weight and the glaucousness of the plant and the longer hairs at the apex of the internodes [this character was used by Nash to key out *A. littoralis*] do not couple with other characters. The flabellate character of the inflorescence seems reasonably constant and coupled with a definite geographic range, but intergrades with var. *frequens* and hence I believe is better considered a variety than a species. A single marked exception occurs linking this variety to var. *villosissimus* [one or two specimens of var. *villosissimus* are however noted as approaching var. *polyclados*]. NEW JERSEY: Five-mile Beach, *MacElwee*, no. 2024. The following specimens, listed above approach var. *frequens* in a greater or less degree, but all show a noticeably flabellate tendency in the inflorescence. MISSISSIPPI: Bayou Porto, *Tracy*, no. 3795. KANSAS: Riley Co., *Norton*, no. 582. NEBRASKA?: Republican Fork, *Englemann* and IOWA: Sioux City, *Pammel*, no. 107.

BOSTON, MASSACHUSETTS.

ADDITIONS TO THE FLORA OF CONNECTICUT.

SINCE the publication in 1910 of the Catalogue of Flowering Plants and Ferns of Connecticut,¹ a large amount of exploration has been done in the state and several previously unknown or inaccessible collections have been examined. The present article is an attempt to put the more important results of this work on record.² It includes reports of 88 indigenous and of 72 introduced species, varieties and named forms not included in the former publication. These have been marked, the native plants with an asterisk and the introduced plants with a dagger, in the following list.

¹ Bulletin no. 14 of the State Geological and Natural History Survey of Connecticut.

² In the case of records not here published for the first time, reference has been made in parenthesis to the original publication.